

# Area Formulas

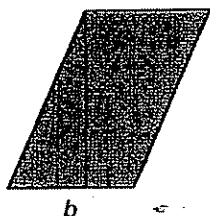
Find the area of a parallelogram. (Rectangle, Square)

## VOCABULARY

The **base** of a **parallelogram** is the length of any of its sides.  
The **height** of a **parallelogram** is the *perpendicular distance* between the side whose length is the base and the opposite side.  
Two lines are **perpendicular** if they meet at a right angle.

### Area of a Parallelogram

$$\text{Area} = \text{base} \cdot \text{height}$$



$$A = bh$$

Find the area of a triangle.

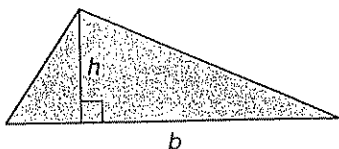
## VOCABULARY

The **base** of a **triangle** is the length of any of its sides. The **height** of a **triangle** is the perpendicular distance between the side whose length is the base and the vertex opposite that side.

### Area of a Triangle

Words     Area of a triangle =  $\frac{1}{2} \cdot \text{base} \cdot \text{height (altitude)}$

Algebra      $A = \frac{1}{2}bh$



$$\frac{b \cdot h}{2}$$

## Finding the Area of Combined Figures

Find the area of the figure at the right.

### Solution

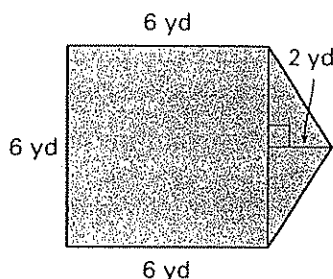
(1) Find the area of each shape.

Area of the triangle:

$$\begin{aligned} A &= \frac{1}{2} \cdot b \cdot h \\ &= \frac{1}{2} \cdot 6 \cdot 2 \\ &= 6 \end{aligned}$$

Area of the square:

$$\begin{aligned} A &= s^2 \\ &= 6^2 \\ &= 36 \end{aligned}$$

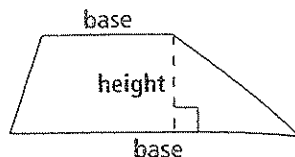


(2) Add the areas together to find the total area.

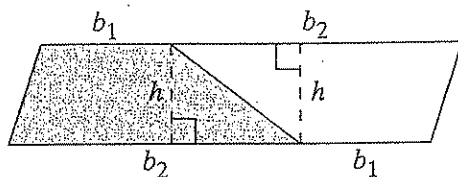
$$6 + 36 = 42$$

Answer: The area of the figure is 42 square yards.

The two parallel sides of a trapezoid are the **bases** with lengths  $b_1$  and  $b_2$ . The **height**  $h$  is the length of a perpendicular segment connecting the bases.



If you put two identical trapezoids together, you get a parallelogram. The area of the parallelogram is  $(b_1 + b_2)h$ . The area of one trapezoid equals  $\frac{1}{2}(b_1 + b_2)h$ .



average of bases  $\cdot h$

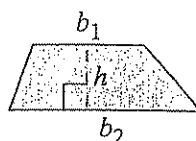
$$\frac{b_1 + b_2}{2} \cdot h$$

### Key Concepts

### Area of a Trapezoid

The area of a trapezoid is one half the product of the height and the sum of the lengths of the bases.

$$A = \frac{1}{2}h(b_1 + b_2)$$



You can estimate the area of states shaped like trapezoids.

### 1 EXAMPLE Finding the Area of a Trapezoid



**Geography** Estimate the area of Arkansas by finding the area of the trapezoid shown.

$$\begin{aligned} A &= \frac{1}{2}h(b_1 + b_2) && \leftarrow \text{Use the area formula for a trapezoid.} \\ &= \frac{1}{2}(242)(250 + 190) && \leftarrow \text{Substitute for } h, b_1, \text{ and } b_2. \\ &= \frac{1}{2}(242)(440) && \leftarrow \text{Add.} \\ &= 53,240 && \leftarrow \text{Multiply.} \end{aligned}$$

The area of Arkansas is about 53,240  $\text{mi}^2$ .

